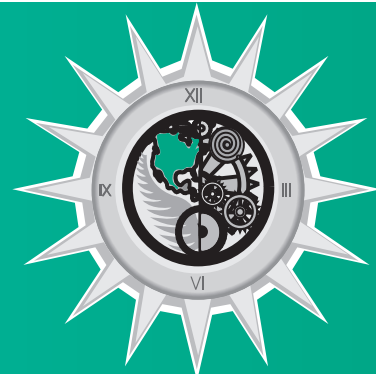


ESAVE

Environmental Stewardship & Value Engineering

Quarterly Newsletter for the United States Department of Energy,
National Nuclear Security Administration



Hanford detection tubes will aid in homeland defense training



Duff Wonders (above) and John Hanson of the Hanford Site packed up 834 chemical detection tubes for use in training emergency personnel to respond to terrorist-related chemical attacks.

More than 800 outdated chemical detection tubes were transferred recently by Bechtel Hanford, Inc. (BHI) for redistribution to the U.S. Department of Justice by the Department of Energy's (DOE) Homeland Defense Equipment Reuse Program.

The detection equipment will be used to help train emergency preparedness staff members across the country in responding to possible terrorist attacks. The equipment transfer also helps eliminate expensive disposal costs for the outdated tubes at the Hanford Site.

The tubes are used in industrial hygiene activities on the Environmental Restoration (ER) Project managed by BHI. Each tube costs between \$5 and \$10 and is manufactured to detect a specific chemical such as ammonia, benzene, carbon dioxide, formaldehyde or sulfuric acid. At Hanford, the tubes are used to detect nearly 40 different chemicals.

Air is drawn through the tube, which contains a compound that changes color when it comes in contact with a specific chemical. Calibration marks on the tube indicate the concentration of the chemical. Each tube has an expiration date and cannot be used for safety-related purposes after that date. However, they can be used for training purposes, which makes them valuable to the Office of Homeland Security and the Department of Justice.

"DOE's old but functional equipment that no longer meets current needs or specifications is a valuable resource to various law enforcement and Homeland Defense organizations," said M. Lee Bishop, program manager of DOE's National Center of Excellence for Metals Recycle in Oak Ridge. "This is a great start, and we truly appreciate BHI's efforts, since this type of equipment normally is not available for training emergency response and security personnel because of its expense."

To help protect the nation against radiological and chemical terrorist threats, DOE is working with the Department of Justice to See 'Hanford detection tubes' page 4

Sandia's reusable explosive device drawing national attention

A cheap, safe way to stun kidnappers or terrorists without harming hostages is getting the attention of various law enforcement agencies. The nonlethal device being developed at the U.S. Department of Energy's Sandia National Laboratories is about the size of a small soda can. The grenade creates a blinding, deafening, yet ultimately harmless explosion when lobbed into a room. Unlike earlier versions that ignite from concentrated materials, the explosive source in this device fans out as an airborne powder before it ignites, making it less dangerous to hostages. The device, the brainchild of Sandia researcher Mark Grubelich, is reusable, making it ideal as a training tool and creating less waste than conventional grenades.

Contact Howard Kercheval, Sandia National Laboratories, 505-844-7842 or hckerch@sandia.gov



Photo by Randy Montoya

Sandia security personnel observe the visual and concussive effects of the new Sandia explosive device designed to stun kidnappers or terrorists.

ORNL's new facilities to have environmentally friendly features



Being able to see the stars is rare in suburban settings these days but ORNL's new outdoor lighting designs that keep more of the light pointed downward may help bring back starry nights in Tennessee. ORNL is installing light pollution-reducing lighting in the new parking lots and in other areas.

Environmentally friendly technologies are being used in the construction of the new buildings and modernization projects at the U.S. Department of Energy's (DOE) Oak Ridge National Laboratory (ORNL).

"Sustainable-design criteria are being incorporated into the new facilities' designs whenever feasible," says Tim Myrick, who heads the new facilities drive.

Paula Logan oversees the ORNL building program from an environmental standpoint, reviewing the projects independently and putting together an overall sustainable design approach. "We have taken the Leadership in Energy and Environmental Design (LEED™) rating system (developed by the U.S. Green Buildings Council, a building industry coalition that promotes environmentally responsible building technologies) ... and we're developing our own sustainable rating tool for research facilities, called ORNL SMART (for Sustainable Measures and Rating Tool) ... to apply to a research facility using LEED and several other models."

Logan said site selection is a major component of the program. "We are taking sustainable credit for choosing previously developed sites (including "brownfields") instead of plowing up new, undisturbed land. One of our goals has been reduced site disturbance—leaving as much green space as we can."

Heating, ventilation and air-conditioning systems will use no ozone-damaging chlorofluorocarbon coolants. The lab is going a step further by also avoiding the use of hydrochlorofluorocarbons, which, although less stable and not as damaging to the upper atmosphere as CFCs, still have a potential climate-change impact. "Cool roofs" also are being employed—highly reflective roofs that reflect the sun's heat, reducing cooling loads. One goal is to better the American Society for Heating, Refrigeration and Air-Conditioning Engineers energy-efficiency standards by 20 percent.

ORNL has an agreement with Tennessee Valley Authority to use as much wind-generated "green" power as TVA can supply—less than half of 1 percent of the lab's overall need. The new buildings will use less power, and the power they do use will be generated with as little environmental impact as is feasible. The use of low-VOC paints, sealants and coatings will create a more pleasant

interior for workers and indoor air will be continuously monitored.

Water consumption in the buildings will be minimized by the use of low-flow technologies in fixtures. Meanwhile, rainwater will be collected and recycled for use on the landscaping outside. Tree planting will produce natural cooling through shade.

Recycling will figure highly in the new buildings, which will have collection centers. Recycling is already being practiced with the new facilities' construction. "At least half of construction waste, including all of the old pavement ... from the east parking lot, will be used by the contractor as aggregate, or rock fill, for various purposes," Logan said. "That waste is thereby diverted from landfills." At least 20 percent of materials used in the construction will be local or regional materials—from within a 500-mile radius—which reduces transportation costs.

ORNL is installing light pollution-reducing downward-aimed lighting in the new parking lots and in other areas. The parking lots include other environmentally friendly steps such as the use of "pervious" asphalt which allows rainwater to soak through, hopefully mitigating the storm runoff problem that has created regulatory problems in the past.

Contact Tim Myrick, 865-241-4597 or uyt@ornl.gov and go to <http://www.ornl.gov/reporter/no36/apr02.htm>

Vibe-powered sensor transforms shakes into electrical power



Photo by Randy Montoya

A team of Sandia National Laboratories researchers led by Kent Pfeifer has designed and demonstrated the feasibility of a wireless, battery-free sensor and data-storage device powered by the subtle vibrations of structures, such as buildings and bridges.

Researchers at the U.S. Department of Energy's (DOE) Sandia National Laboratories have designed a wireless, battery-free sensor that would power itself by converting mechanical energy from the subtle vibrations of buildings and bridges into electrical power. Civil engineers might use such a device to check the health of a structure—a hospital, government building, dam, or tunnel—following an earthquake, storm, bomb blast, or other catastrophe. Because the sensor system requires no hookups to batteries or wires, it could be embedded into a structure during construction and forgotten until a need arises to take a reading.

Contact Howard Kercheval, Sandia National Laboratories, 505-844-7842 or hkerch@sandia.gov

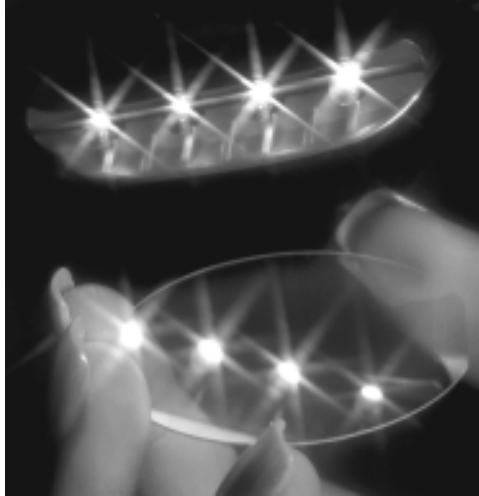
Sandia solid-state research shines with white light but no heat

The U.S. Department of Energy's (DOE) Sandia National Laboratories is among the research entities around the country in the forefront of a revolution that will change the way we light our homes,



Photos by Randy Montoya

Sandia researcher Art Fischer holds a sapphire substrate with indium gallium nitride layers. This is the base material for semiconductor light-emitting diodes that emit green, blue, and near-ultraviolet light.



Closeup of the substrate for the semiconductor light-emitting diode.

primary lighting source—incandescent bulbs and fluorescent tubes—with semiconductor light-emitting diodes (LEDs)—also known as solid-state lighting. Lighting is presently responsible for roughly 20 percent of electricity consumption.

“Just as for electronics, glass bulbs and vacuum tubes are

giving way to semiconductors,” said James Gee, senior scientist heading up the project with department managers Jerry Simmons and Bob Biefeld. “And as in the microelectronics revolution, many of the possible applications for solid-state lighting will occur in ways that have not yet been envisioned.”

Solid-state lighting is expected to beat conventional lighting both in performance and cost. “This new white light source could change the way we live, and the way we consume energy,” added Simmons. “LEDs could be 10 times more efficient than incandescent bulbs and two times more efficient than fluorescents.”

In 1993 researchers at several universities in the U.S. and Japan developed a fairly efficient blue light LED based on gallium nitride. Efficiency improvements followed quickly. Today, energy-efficient LEDs are available from red to green to blue light, making it possible to generate white light for illumination. However, Gee noted, LED-based light sources won't be practical until their costs are reduced and efficiency is further increased. Numerous industrial companies, as well as universities, are working to develop technologies for solid state lighting. However, “Sandia is unique” in this area, according to Biefeld, “due to our extensive capabilities in semiconductor growth and processing, reactor modeling, and experimental and theoretical materials physics, all located at a single institution.”

Sandia has launched a new web site that will offer comprehensive information on LEDs and solid-state lighting. The site includes up-to-date science and technology and business news, a calendar of industry events, background articles and updates on the proposed national initiative to accelerate progress in solid-state lighting, and a searchable database of relevant patents.

Contact James Gee, 505-844-7812 or jmgee@sandia.gov and go to <http://lighting.sandia.gov/>

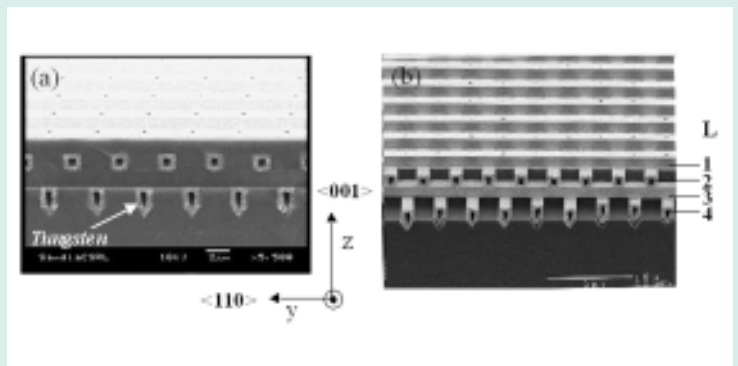
Tungsten light bulb is really cool

Sandia National Laboratories researchers also are looking into a tungsten filament made with an internal crystalline pattern for its potential to convert wasted infrared energy into visible light.

This microscopic tungsten lattice could raise the efficiency of an incandescent electric bulb by more than 60 percent, reducing electrical generating capacity and costs to homeowners caused by inefficient lighting, as well as the environmental damage created by unnecessary power generation.

The advance also opens the possibility of increased efficiencies in thermal photovoltaic applications (TPV). The first step toward this goal was achieved by Shawn Lin and research colleague Jim Fleming. Fabrication of the device was accomplished by an extension of well-known MEMS (microelectromechanical systems) technologies that are descended from older semiconductor technologies. As a result, fabrication of such devices could be cheap and easy.

Past research by Lin led to development of a photonic lattice that can bend and redirect light, and that work has been key in the development of a more efficient light bulb. Lin has been recognized by the Chinese Institute of Engineers/USA for work that “opens the door for totally integrated optical systems that

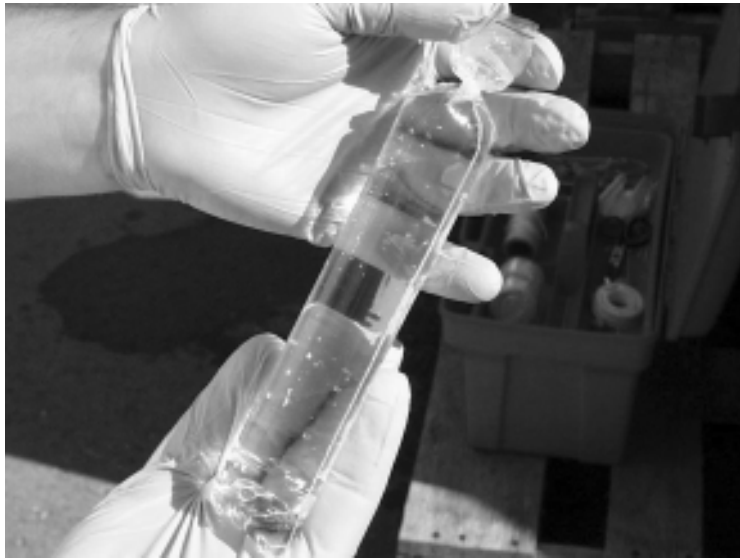


Images of a Sandia 3-D tungsten photonic crystal, taken by a scanning electron microscope, which shows great promise for converting heat to light. The microscopic image at left (a) was taken using an oxide; (b) was taken without an oxide. Spacing of the tiny tungsten bars forms crystals which permit only certain wavelengths of energy to pass, depending on the design of the “lattice.”

might replace traditional electronic devices in communication and eventually, maybe in computers.”

Contact Neal Singer, Sandia, 505-845-7078 or nsinger@sandia.gov and go to <http://lighting.sandia.gov/>

KCP saves water, money, and time by sinking plastic bags in wells



Plastic bags are used to test for chlorinated solvents in groundwater at KCP.

Testing groundwater at the Kansas City Plant traditionally involved an expensive, time-consuming process of pumping gallons of water, just to retrieve a small sample suitable for testing.

The opportunity to save both time and money on the testing process was evident, considering that more than 200 wells exist on the property.

Kansas City Plant staff environmental protection specialist Joe Baker, senior information technology system engineer Steve Ramm, and environmental safety and health manager Brad Heacock uncovered an opportunity to make the improvements.

Baker learned the U.S. Geological Service was testing a new method where plastic bags were used to test the amount of chlorinated solvents present in the water, such as trichloroethylene.

The new method of sampling allows technicians to place a plastic bag filled with distilled water into each well. As the bag is suspended in the bottom of the well, the groundwater slowly diffuses into the bag, mixing with the pure water. After two weeks in the bottom of the well, the bag is pulled to the surface, a corner is clipped, and a sample of the water is poured into a vial and tested.

Following approvals from the state of Missouri and the Environmental Protection Agency, the new groundwater testing process

was accepted as an ongoing practice, making the Kansas City Plant the second site in the nation and the first in Missouri to use the new sampling process.

"We performed tests on our wells using the new method," Baker said. "We also conducted the same tests, using the traditional method of sampling to find out if the results we collected were statistically consistent with the results from the old method. The new method of bag sampling proved to be just as accurate."

This method could not be any simpler to use. The savings it provides have been immediate and we can still ensure the reliability of our groundwater tests."

As a result of introducing this new process, the Kansas City Plant has reduced the cost of groundwater sampling in 2001 by 54 percent, from \$32,000 to \$14,000.

Wastewater was decreased by 98 percent from 783 gallons per year to 18.8 gallons. The traditional method required nearly 11 gallons of water to be pumped from each well to obtain a sample.

"We pulled bags from 10 wells and tested the water in the same amount of time it took to complete testing on just one well using the old method," Ramm said. "The time savings were obvious from the start and proved to be significant. Honestly, with the new testing method in place, the paper-work takes longer to do than the sampling."



A plastic bag filled with distilled water is suspended in a sampling well for two weeks. Groundwater slowly diffuses into the bag, the bag is pulled to the surface, and the sample is tested.

Contact Joe Baker, 816-997-7332 or jbaker@kcp.com and Steve Ramm, 816-997-7040 or sramm@kcp.com

NETL scientists ponder flame oscillation vibrations

Scientists at the U.S. Department of Energy's National Energy Technology Laboratory (NETL) are using particle image velocimetry to understand why and how flames oscillate as their fuel-to-air consumption ratio is decreased. When new fuel-flexible gas turbines are designed to run at these "lean-burn" conditions, they will produce electricity with less pollution. But flame oscillations could set up vibrations in the machinery—vibrations strong enough to tear a \$100 million engine apart. Models incorporating NETL's research results could help solve the problem.

Contact Damon Benedict, NETL, 304-285-4913 or damon.benedict@netl.doe.gov

From 'Hanford detection tubes' page 1

make older-generation equipment available to emergency preparedness organizations in major U.S. cities. DOE also is working with the International Atomic Energy Agency to distribute equipment to other countries for use in responding to industrial accidents and terrorist threats.

"The outdated tubes would otherwise be disposed of as hazardous waste at considerable taxpayer expense," said Doug DuVon, waste minimization and pollution prevention coordinator for BHI. "By donating the tubes, Bechtel Hanford is avoiding more than \$15,000 in hazardous waste disposal costs."

BHI shipped the tubes to the Oak Ridge National Electronics Recycle Center, where they will be redistributed to interested users. The Hanford ER Project team is working with DOE to identify other equipment that could be donated to the program.

Contact Doug DuVon, 509-372-9182 or dkduvon@bhi-erc.com

NAVAIR Depot North Island number one with the White House



Official U.S. Navy photos by Bill Bertkus

Scott Johnson uses a laser-guided spray gun to apply a topcoat of paint on an F/A-18 fuel tank in the Paint Facility at NAVAIR Depot North Island. Two laser beams come together into one when sprayer is at optimum distance and proper angle, making the painting operation more efficient and less expensive, and reducing the environmental impact of painting and coating aerospace surfaces at the Depot.

Environmental management systems may not be glamorous, but they can be prestigious. Registering to the International Organization of Standards' ISO 14001 standard is an impressive feat, and Naval Air Systems Command (NAVAIR) Depot North Island was the first Federal facility to accomplish that. Now, the Navy industrial facility at North Island has been cited by the White House for its achievements in environmental management (see *ESAVE*, Spring 2002).

The White House gave its 2001 Closing the Circle Award to the Depot in the category of Environmental Management Systems. The award is coordinated through the Office of the Federal Environmental Executive, John Howard, a White House appointee who oversees all Federal agencies and monitors progress against the environmental goals of Executive Orders.

"The award is a result of the effort of (the plant's 3,000-plus employees) and the members of the Environmental Improvement Team (EIT)," said Ray Paulson of the EIT. "The focus of our award submittal was the outstanding pollutant reductions for significant cost avoidances (\$900,000 total in 1999 and 2000) demonstrating the Environmental Management System (EMS) continual improvement process."

"The goal of the EIT is to identify solutions for the plant in all areas, and we relate that to environmental benefits. It has been a

huge success," said Paulson. "We have accomplished significant reductions in the last two years with this EMS approach. This is especially significant because it had been thought that all the major pollution reductions had been accomplished."

The Depot's Environmental Management System, administered by Mel Barrera, has streamlined the management process to identify and implement solutions that benefit the environment, Paulson stated.

According to Mel Barrera, "The key to any EMS is closing the loop for the continual improvement process. At the Depot, the shop and shop support personnel are visited each year, as required by command EMS policy, to provide environmental awareness training and feedback for sustaining compliance, and to obtain environmental improvement solutions. The Environmental Improvement Team generates additional improvement solutions and assists the shop and shop support personnel with the detailed information necessary for presenting the improvement solutions to management for implementation. This inclusion of everyone in the plant for the improvement process has created a synergy of ideas: the results and have been fantastic."

Along with Paulson, the EIT includes Larry Lausin, John Reyes, Marc Glasoff, Mike Tong, Kim Lee, Thomas Mitch, Ernest Shiwanov and Mike Hammond. In addition, a number of alternates for EIT members have played critical roles at various stages for the success of the pollution prevention program. These subject matter experts provide the EMS process that critical link to the shops and support staff.

Contact Mel Barrera, 619-545-3236 or barreramm@navair.navy.mil

OFEE names DOE sites as 2001 Closing the Circle Award winners



Closing the Circle awards are given by the Office of the Federal Environmental Executive, John Howard, who heads up the White House Task Force on Waste Prevention and Recycling, to promote environmental stewardship. This year's U.S. Department of Energy (DOE) winners, by group and category, are:

- Affirmative Procurement: Sandia National Laboratories, Green Purchasing Team "Sandia National Laboratories' Dedicated Contracts"
- Education and Outreach: Hanford Site P2 Program, Hanford Site Outreach & P2/WMin Team, "Hanford Site Pollution Prevention Outreach and Education Program"
- Environmental Preferability: Pacific Northwest National Laboratory, Green Products Custodial Products Team "Greening our Custodial Products" (see *ESAVE*, Fourth Quarter 2001)
- Recycling: Los Alamos National Laboratory, Actinide Process Chemistry Group (NMT-2) "Closing the Circle on One Problematic Nitrate Waste Stream at LANL" (see *ESAVE*, Spring 2002)

An honorable mention in Education and Outreach went to DOE's Bonneville Power Administration.

Contact Susan Weber, DOE/HQ, 301-903-1388 or susan.weber@em.doe.gov and go to <http://www.ofee.gov>

Los Alamos 'Site +' green building design campaign takes off



The recently completed Nicholas C. Metropolis Center, one of the new buildings at LANL to incorporate sustainable design principles, is being outfitted with one of the largest computer arrays in the world. It incorporates several sustainable features including modular cooling, daylighting where possible, and other measures.

The U.S. Department of Energy's (DOE) Los Alamos National Laboratory is about to embark on an ambitious series of building projects designed to replace its existing infrastructure that dates, in part, back to World War II.

In order to more effectively carry out its vital mission of stockpile stewardship, the Laboratory needs to operate in modern, secure, and purpose-built facilities. One of the benefits of such a massive planning and building effort, according to Thomas P. Starke, the lab's Pollution Prevention program leader "is the opportunity to build environmentally sustainable structures that are delivered on time, within budget, and are supportive of our changing mission."

The lab, lead by its Project Management Division, has adopted a set of "Site + Architectural Design Principles." Environmental responsibility is a key element of this effort. Indeed, the document contains a commitment that major new construction will conform to the certified level of the Leadership in Energy and Environmental Design (LEED™) guidelines of the U.S. Green Building Council.

So that people can become more familiar with these standards, Starke's office has sponsored a series of training sessions on the LEED rating system. These sessions have been attended by future building "owners," local architectural and engineering firms, project planners, facilities engineering workers, and pollution prevention professionals.

With the increased knowledge of the details of energy efficient design principles, all participants have been better able to discuss and consider options in the early stages of planning. In addition, Laboratory employees have participated in training under the jointly sponsored DOE-EPA Laboratories for the 21st Century (Labs21) program. Laboratories are huge consumers of electricity, so attention to the design of fume hoods, HVAC systems, and insulation can have very positive savings impacts.

An example of how early attention to sustainable design works in practice can be seen in the planning for the lab's proposed Fuel Cell National Resource Center (FCNRC). This structure will bring together the work Los Alamos has been doing on low-temperature fuel cells for nearly 20 years. The team working on the initial preparation for the structure is led by Ken Stroh, the Fuel Cell Program manager. Stroh is hoping that the FCNRC design will be LEED-certified and that it will become a pilot site for the Labs21 program.

"We think it is important that our work on renewable energy take place in a laboratory that itself represents environmental responsibility and energy efficiency," Stroh said. "Using the LEED standard provides us with a metric to gauge our designs," he continued.

The FCNRC team hopes to be able to use photovoltaic panels to generate electricity to power an electrolyzer. This will, in turn, separate water into oxygen and hydrogen. The hydrogen will be used to run a fuel cell that will provide both electricity for the building and pressurized hydrogen for experimental use.

Two other elements play major roles in Los Alamos' quest for sustainable building design:

- Flexibility equals sustainability. Missions change, people change, and research equipment changes over the functional life of a facility. Work that 10 years ago was done using "wet" chemistry can now be simulated on a computer, for example. New structures can be planned to accommodate changes without requiring massive reconfiguration. Lab utilities can be supplied from above the lab spaces by using an over-large ceiling area known as an interstitial. Network wiring can be installed (at minimal cost during construction) so that signals from experimental equipment can be read throughout the building.
- Many materials from existing structures can be recycled. At Los Alamos, old roofing has been converted into base for a parking lot. Concrete and asphalt have been removed from the site and sold to a local recycler.

"As we move forward with the planning for these new facilities, I have been very impressed at how quickly everyone connected with the projects wants to make them as sustainable as possible," said Starke. "We are well on the way to fulfilling the commitment to have all new construction LEED-certified."

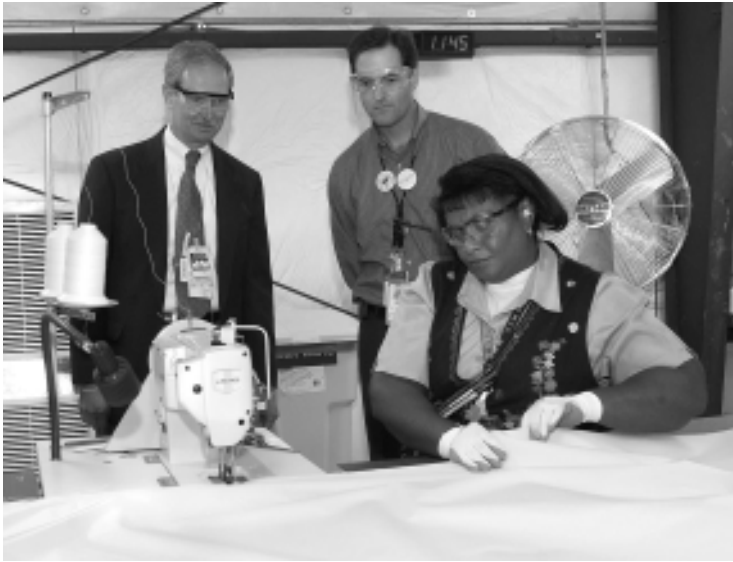
Contact Thomas P. Starke, LANL, 505-667-6639 or tps@lanl.gov

National Pollution Prevention Week coming in September

Businesses, environmental groups and ordinary citizens can join forces for a common cause during National Pollution Prevention Week, Sept. 16-22. By sharing information about pollution prevention; businesses can become more competitive, business and government can realize cost savings, and environmental quality can be enhanced. The National Pollution Prevention Roundtable will present the Most Valuable Pollution Prevention Awards Sept. 18 in Washington, DC.

Go to <http://www.p2.org/P2Week/>

Growing SRS operation can't be contained by old facility, moves to new one



Operator Constance Dorsey (sitting) gives Westinghouse Savannah River Company President Bob Pedde (left) and Facility Support Service Division's Byron Neely a demonstration on sewing a hut in the new Radiological Operations Support Center at the Savannah River Site.

When a group goes from a “scratch” operation to outgrowing their facility and having a new one built for them—all in three years—they’re doing something right. According to Westinghouse Savannah River Company (WSRC) President Bob Pedde and Nuclear Materials Maintenance Division (NMMD) maintenance manager Jim Tisaranni, the team that makes containments and glovebags is doing just about everything right.

“How often do you see a group that pays for their own salaries?” Tisaranni said to a group gathered for the May ribbon cutting at the new Radiological Operations Support Center (ROSC) at the Savannah River Site (SRS).

When the cross-divisional team of NMMD and Facilities Support Service Division (FSSD) employees began making containments three years ago, they started with a 3,000-square-foot facility, called the Containment Fabrication Facility (CFF) (see *Pollution Prevention Advisor*, Fourth Quarter 1996).

The team was working around abandoned process equipment,

and they had one table, two sewing machines and two heat sealing machines to work with, says first-line manager Randy Reames of FSSD. The first hut took four weeks to complete, and it took the entire shop to do it. “We always tried to build the next hut better and faster,” Reames says.

In that first year, the CFF team made 210 containments, both huts and glovebags. The next year, they did 400 containments; last year, they did 830. The first year, savings from waste minimization totaled \$340,000; the second year, it was \$500,000. All told, the team has made 75 huts, 300 glovebags, more than 300 catch containments, and more than 900 sleeves, waste bags, liners, and cover tarps. The reusable, launderable glovebags, huts, and catch containments minimize the generation of secondary wastes during work on contaminated equipment and sites.

The team’s work included a fire suppression training hut at Aiken Technical College; portable bio-terrorism bags used by Wackenhut Services, Inc., the State Law Enforcement Division, the U.S. Justice Department and the FBI; and huts at the Los Alamos National Laboratory (LANL) produced through the expertise SRS workers shared with LANL employees.

When the group became desperate for more space, the operation became even more of a team effort. Solid Waste, ESH&QA, Project Engineering and Construction Division, NMMD and FSSD are all part of the successful effort that culminated in the new ROSC facility. The number of sealing machines has doubled and the number of sewing machines has tripled, and there are now air tables for material handling. From concept to production, the ROSC project was executed in four months.

Containments team members are Steve Butterfield, Norman Carr, Constance Dorsey, Lena Foreman, Robert McGee, Stan Perhonish, Christine Williams, Roger Rabon, Randy Reames, Perry Byrd, Dorothy Kruger, and Greg Czech. Funding for both the old Containment Fabrication Facility and the new Radiological Operations Support Center was provided by the U.S. Department of Energy Savannah River Operations (DOE/SR) Pollution Prevention Program.

Contact Steve Mackmull, DOE/SR, 803-525-3817 or stephen.mackmull@srs.gov and Tim Coffield, WSRC, 803-557-6316 or tim.coffield@srs.gov

Hanford reduces TRU disposal costs with NDA of suspect waste

The Hanford Site has approximately 14,800 cubic meters of retrievably stored, suspect transuranic (TRU) waste located at the burial grounds. In the absence of characterization technology, much of the waste in inventory was originally classified as contact-handled, suspect TRU, based on process knowledge.

However, using the current limit of 100 nanocuries TRU per gram, much of the waste can actually be classified as low-level waste (LLW). A TRU mobile non-destructive assay (NDA) service was contracted in order to determine and segregate TRU waste from LLW. Containers that assayed as LLW were returned to the burial grounds for permanent disposal. Containers that assayed as TRU will be processed at the Waste Receiving and Processing (WRAP) Facility and eventually be shipped to the Waste Isolation Pilot Plant in New Mexico for permanent geologic disposal.

A total of 509 55-gallon drums (122 cubic meters) were assayed in calendar year 2001; 375 of these drums (90 cubic meters) were

classified as LLW. This characterization process eliminated additional handling of the drums, thus saving \$117,750 per cubic meter in life-cycle cost. For the calendar year 2001, the net savings was \$10,240,000, a 2,884 percent return-on-investment based on the implementation cost of \$355,200.

This project has shown that utilizing mobile NDA equipment and services will reduce life-cycle cost for the certification of Hanford’s suspect TRU waste inventory. During future retrieval campaigns, mobile assay equipment and services will be deployed. However, mobile assay contractors need to be continually evaluated for all aspects of their quality assurance programs, including validation of software and use and control of maintenance and test equipment.

Contact Judith Nielsen, Fluor Hanford, 509-373-6732 or Judith_A_Nielsen@rl.gov

Pacific Northwest ships clean lead brick to NASA lab for reuse



A worker at Pacific Northwest National Laboratory loads used lead brick for off-site shipment to NASA.

Over 37,000 pounds of used, clean lead brick was shipped from Pacific Northwest National Laboratory (PNNL) to the National Aeronautics and Space Administration (NASA) for reuse on a research project. Shipping the lead to NASA for reuse meant the brick was not treated as hazardous waste, avoiding about \$540,000 in disposal costs, according to PNNL estimates.

The PNNL lead brick was originally advertised on the Department of Energy (DOE) Materials Exchange website, where staff from DOE's

clearinghouse for lead at the National Center of Excellence for Materials Recycle identified it as a potential source of material to fill a recent request from NASA, which needed lead brick to construct a shield wall for isotopic research at a Maryland facility. Clearinghouse staff also knew of brick available from Los Alamos National Laboratory (LANL) and Idaho National Engineering and Environmental Laboratory (INEEL).

"We were established as the DOE clearinghouse for lead by the Secretary's Memorandum for Headquarters and Field Elements on January 19, 2001," said project manager Marvin Bennett. "DOE sites are not supposed to dispose of old lead or buy new lead until they check with us. We make sure (DOE) lead is used only within the nuclear industry." Since July 2000, DOE has suspended the recycling of its metal scrap outside of DOE.

Bennett said the NASA transfer includes not only the approximately 1,700 brick from PNNL, but also about 2,000 lead brick each from LANL and INEEL. "All NASA paid for was the transportation costs," said Bennett.

Contact Glenn Thornton, PNNL, 509-376-7688 or glenn.thornton@pnl.gov and Marvin Bennett, 865-576-0853 or BennettME@oro.doe.gov

NNSA/NV FFACO sites institute new waste prevention design

The National Nuclear Security Administration's Nevada Operations Office (NNSA/NV)



has instituted a new methodology to reduce the amount of investigation-derived waste (IDW) comprising potentially hazardous and potentially radioactive waste streams. The new waste prevention design reduces the amount of material to be staged, inspected, hauled, shipped, characterized, and disposed of.

IDW is typically managed as potentially hazardous, potentially radioactive, or potentially mixed waste pending receipt of laboratory analytical results and data validation. In the past, IDW from three sources—personal protective equipment (PPE), disposable sampling, and rinse water—has been characterized using laboratory analytical results from site characterization samples, historical knowledge of the site, and knowledge of the IDW generation process. This methodology results in the management of considerable amounts of IDW, which await characterization and disposal within the time frame of the RCRA "90-day clock."

NNSA/NV has designed a method for field-screening IDW that actually reduces the amount of waste entering the potentially hazardous/radioactive/mixed waste streams at the source. This new process was made possible by a very effective Preliminary Assessments program combined with the considerable remediation experience of personnel at the Nevada Test Site—including significant data on completed projects—a cooperative working relationship with the Nevada Division of Environmental Protection (NDEP), and guidelines established within the Federal Facility Agreement and Consent Order (FFACO).

The new strategy allows for visual inspection of potentially hazardous PPE IDW for staining, discoloration, and/or gross contamination as the waste is generated. PPE IDW that passes the visual inspection is then surveyed or swiped for radiological characterization. PPE IDW that passes both the visual inspection

and the radiological screening is disposed of in a sanitary waste dumpster, unless site-specific circumstances warrant otherwise.

In accordance with previous NDEP guidance, soil or debris displaced during sampling was traditionally placed back in its original location. In some instances, soil was containerized in drums or simply piled next to the sampling location and covered, with the RCRA 90-day clock ticking. The new strategy allows soil or debris that is containerized or stockpiled to remain on-site until implementation of remedial action at the site, which significantly reduces IDW waste volume during site characterization.

The third source of IDW, rinse water at sites with no "listed" hazardous constituents will not be considered hazardous waste unless the rinse displays a RCRA characteristic, such as a visible sheen, unusual pH, or if the rinse has been used on equipment or materials associated with the release or spill of a hazardous substance.

Rinse water that is determined to be nonhazardous and contaminated to less than five times Safe Drinking Water Standards (SDWS) is not restricted as to disposal. Rinse water that is contaminated at levels five to ten times SDWS, but is non-hazardous, is either disposed of in an established infiltration basin, or solidified and disposed of as sanitary waste or LLW. Non-hazardous rinse waste contaminated at greater than 10 times SDWS may be disposed of in a lined basin or solidified and disposed of as sanitary waste or LLW.

The new process is estimated to reduce the volume of IDW at the source by 11,167 cubic feet, resulting in a cost savings of over \$1.4 million through 2007, the life cycle of the FFACO Environmental Restoration Project. This IDW management practice is being applied to all NNSA/NV sites within the purview of the FFACO, and could be applied to any Department of Energy site where there is comprehensive knowledge of the site, with the approval of that site's state environmental protection organization.

Contact Charlotte Franky, NNSA/NV, 702-295-2270 or cfranky_it@nv.doe.gov

Laboratory's 'Save a Watt' contest winners take action, eat free



Jeff McCullough (left), key instigator of electricity conservation initiatives in the winning PNNL buildings, being congratulated by Curt Nichols, Manager for Energy in Lab Operations.

"Save a Watt and Get Free Eats" has been the buzz at the Pacific Northwest National Laboratory (PNNL). Pacific Northwest held a "Save a Watt" contest to energize staff to conserve electricity. Buildings competed against each other to win monthly awards of free doughnuts and the major award of a free catered lunch at the end of the contest. Eight buildings on the Pacific Northwest campus in the contest reduced their electricity use by a combined total of 417,487 kWh over three months.

Two of the buildings were the over whelming winners—saving 87,596 kWh. What was their secret? Determination to win—and staff like Jeff McCullough, taking aggressive action. Staff members:

- Met with all groups residing in the buildings and educated them on how to set their computers to automatically go into power saving mode after 30 minutes of not being used.

- Educated staff to turn off the lights when leaving their offices for more than 15-20 minutes and empowered the custodian to turn off lights of vacant offices as they went through the building.
- Routinely checked thermostat settings and schedules to ensure staff comfort and, thereby, minimize the use of portable electric space heaters.
- Empowered staff by educating them on what they could do to make a difference. Jeff McCullough spearheaded it. "We routinely sent building-wide e-mails with reminders and tips which helped to keep energy efficiency in the forefront. As a result, we had a hundred conscientious building energy managers who made sure that energy wasn't wasted."

Next steps for Pacific Northwest are to introduce the "Watt Stopper"—a power strip that senses motion and can be set to turn off electrical equipment after a period of time with no motion as well as turn the equipment on when staff enter the room. Stay tuned for those results.

Contact Mike Moran, PNNL, 509-372-2680 or mike.moran@pnl.gov and go to <http://www.pnl.gov/conserves-energy/>

Unique INEEL natural gas liquefaction facility debuts in California

A first-of-its-kind, small-scale natural gas liquefaction facility in Sacramento, Calif., designed by scientists at the U.S. Department of Energy's (DOE) Idaho National Engineering and Environmental Laboratory (INEEL), was unveiled in June by Pacific Gas and Electric Company (PG&E) officials.

Other significant partners in the pioneering liquefied natural gas (LNG) facility effort include the California Energy Commission, Sacramento Air Quality Management District, SoCal Gas Company and South Coast Air Quality Management District.

INEEL developed the patented technology used in the small-scale liquefier, and PG&E was responsible for installation. "The invention that was required to make this new liquefier is expected to revolutionize the liquefaction industry," said Bruce Wilding, INEEL Natural Gas Products program manager.

One of the revolutionary aspects of the new technology is that it dramatically reduces an LNG plant's size and cost. Standard LNG plants cost about \$10 million to build, and occupy five to six acres. When this prototype technology is fully developed, plant construction cost is expected to be around \$450,000, and only about 240 square feet of space will be required.

The liquefier is one achievement from DOE's joint research and development with the growing clean-energy technology industry. "This project is directed at obtaining relief from oil dependence by diversifying our transportation energy supply," said Mike Anderson, DOE-Idaho Energy R&D project manager. Liquefied natural gas from this plant can be used as a clean, alternative fuel in heavy-duty



Terry Turner, INEEL, left, and Paul Miller, PG&E, illustrate part of the concept behind LNG.

trucks and transit buses.

"Pacific Gas and Electric Company is extremely proud to unveil this quantum-leap technology that is the pathway to a clean air future," said Steve McCarthy, director of Customer Energy management for PG&E. Reducing emissions from heavy-duty vehicles is an essential part of achieving cleaner air. The use of clean-burning LNG is a key component to making this possible.

The new technology is designed to draw natural gas from an existing pipeline at a pressure letdown station, liquefy the natural gas and store it until it is used, trucked away or re-injected into the pipeline. Because of its community-friendly design and low cost, a number of facilities can easily be placed close to clean-fuel customers. Customers could include public entities such as city, county, transit, school district and

waste removal fleets, as well as private fleets such as those used by supermarkets and delivery companies.

The small-scale plant is easily transportable, offering numerous application advantages that no other technology can currently match, including providing emergency services to prevent gas service disruptions or allowing faster gas service recovery.

The plant will now begin a three- to six-month startup and operational testing phase.

Contact Teri Ehresman, INEEL, 208-526-7785 or ehr@inel.gov and Jann Taber, PG&E, 916-923-7053 or JMT1@pge.com

EPA hails LLNL and SLAC as 'Champions of Green Government'



Thomas Kelly (left) and Larry Woods of EPA's Region 9 Federal Facilities Enforcement Office present the Champions of Green Government Award to Stanford Linear Accelerator Center, represented by Rich Cellamare (right).

The Environmental Protection Agency named the U.S. Department of Energy's (DOE) Stanford Linear Accelerator Center (SLAC) and Lawrence Livermore National Laboratory (LLNL) winners of its Champions of Green Government Awards at this year's Western Regional Federal Facilities Conference in Sparks, Nev. in May.

The Fleet Management Team at LLNL's Fleet Maintenance Facility (Sal Ruiz, Beverlee Morales, Jose Pineda, and Dennis Ouka) were recognized for their pollution prevention practices.

The team's efforts began with the installation of an antifreeze recycling system in 1996, followed by the purchase and installation

of two water-based bio-remediating light duty cleaning systems. In 2000, they installed a water-based system to clean brakes, which eliminated the use of VOC-containing aerosol cans. Most recently, the facility added an aqueous parts washer, specifically designed for heavily soiled parts. The group is still planning a wash water reclamation system. In addition to minimizing waste and using greener cleaning methods, the facility uses only re-refined motor oil, recycles air conditioning refrigerant and maintains a compressed natural gas filling station.

SLAC scientists and staff (Ali Farvid, Balbir Gosal, Robert Kirby, Harold Morales, Mary Regan, Michael Hug, Butch Byers, and Richard Cellamare) were recognized for solvent replacement and emissions reduction. A complex cleaning solution was required for parts and equipment in order for them to be used in a particle accelerator, where minute contamination can interfere with subatomic particle experiments. The team used X-ray photoelectron spectroscopy to compare the cleaning performance of existing and new cleaning methods (see *ESAVE*, First Quarter 2001).

Once a method was in place to determine "how clean is clean," the SLAC team replaced two vapor degreasers with a low-water aqueous cleaning system; implemented alternative organic-based solvent in the cleaning of vacuum equipment; and installed a near-zero emission vapor degreaser. The average emissions of TCA from 1988 to 1998 were 5,762 pounds per year. In 2001, the near-zero emissions vapor degreaser decreased emissions by more than 99 percent.

Contact Karin King, DOE/Oakland Operations Office, 510-637-1638 or karin.king@oak.doe.gov

Relamping helps save bucks, energy at Los Alamos National Laboratory

Los Alamos National Laboratory (LANL) reports two developments that will save money and energy simply by reassessing the way the facility is lighted.

Susan Voss from the Environmental Science and Waste Technology Division described the benefits of low-mercury fluorescent lamps to workers and the environment. Voss noted that in the past, mercury (Hg) content was not considered when purchasing a fluorescent lamp.

"Hg lamps can't be landfilled, because they present a leachable mercury hazard," Voss said, "and the spent lamps must be stored, disposed of, or recycled as hazardous waste."

Approximately 20,000 pounds of fluorescent lamps are recycled through LANL's TA-54 annually, at a cost of \$2.71 per pound or \$43,000. Furthermore, radiation-contaminated Hg lamps generate a significant amount of mixed low-level waste at Los Alamos.

To address these problems, Voss recommends using low-mercury lamps, particularly ones that meet TCLP (leaching test) guidelines. Also, she recommends operators enter into a vendor buy-back/recycling agreement for all spent fluorescent lamps, in which delivery of new lamps is dependent on the pick-up of spent ones.

In LANL's agreement with Summitt Electric, for example, the cost of recycling spent lamps was incorpo-

rated into the purchase cost for a 17 percent cost increase. The program reduces the hazards of Hg exposure to the environment and individuals, as well as a reducing mixed low-level waste and eliminating the need for handling and storing hazardous materials on-site.

LANL's Bill Radzinski writes in the lab's *Maintenance Talk* magazine about the many manufacturing facilities that continue to use inefficient lighting practices. Better performing lamps have been developed in recent years and are readily available. Retrofitting with the newer lamps would provide economic benefits as well as improve lighting. Radzinski highly recommends energy efficient fluorescent lamps and optical reflectors and the adoption of scheduled or "group" relamping practices.

As lamps age to beyond 30 percent of their rated life, they emit 35-40 percent fewer lumens. Dirt accumulation within any portion of a lighting fixture will also reduce the amount of available light by an estimated 20-30 percent. Since the typical maintenance practice is to replace lamps only as they burn out (non-scheduled or "spot" relamping), designers habitually specify the installation of more lamps than necessary to compensate for losses due to aging.

This over-installation results in high initial and operating costs that can be avoided by adopting group relamping and cleaning, preferably at the initial stage of construction.

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Dry-ice tile removal technique is much cooler for Y-12 workers



Before –
Traditional Asbestos Tile Removal



After – Dry Ice Asbestos Tile Removal



Workers at Y-12 National Security Complex used to dress out in personal protective equipment before removing old asbestos-laden flooring (left). Using a new dry-ice technique, tile removers wear only gloves, safety glasses, and long-sleeved coveralls.

The use of dry ice (frozen carbon dioxide) in the removal of asbestos floor tile provides cost savings and personnel safety benefits by reducing the time to perform the work, reducing requirements for personal protective equipment (PPE), and easing the physical strain on workers performing the task.

Historically, the removal of asbestos-containing floor tile by carpenters at the Y-12 National Security Complex (Y-12) has been performed using manual methods that require the workers to be in full dress-out PPE such as respirators, paper suits, and gloves, and involves a great deal of physical exertion using straight-hoes to dislodge the tiles. Heat stress was often a major consideration when tile removal was performed in the summer months, because of the dress-out requirements and the requirement to seal the ventilation to the work area.

A better way to remove asbestos-containing floor tile was identified during planning for a large tile-removal job associated with the demolition of abandoned/excess buildings at Y-12.

Argonne membranes extract hydrogen from methane

Dense ceramic membranes for separating hydrogen from gas mixtures are being developed by the U.S. Department of Energy's (DOE) Argonne National Laboratory.

The technology is part of an effort to maximize the use of vast domestic fossil resources and ensure a fuel-diverse energy sector while responding to global environmental concerns. It could provide a cheap source of high-purity hydrogen if hydrogen fuel cells are to replace gasoline engines. Researchers at Argonne have developed a ceramic membrane that can extract hydrogen from methane, the chief component of natural gas. The membranes are a dense composite of iron, oxygen, cobalt and strontium, that only electrons and individual ions can pass through, which is why membranes can produce such pure hydrogen. Ceramic membranes could be a key development in DOE's "Vision 21" program aimed at developing power technologies that discharge no pollutants.

Contact Catherine Foster, Argonne, 630-252-5580 or cfoster@anl.gov

Workers who had used a dry ice technique in previous removals at Oak Ridge National Laboratory (ORNL) suggested that it be used for the Y-12 demolition task. Valuable input was obtained from ORNL Plant and Equipment personnel concerning proper use of the dry ice, its suitability for the proposed task, and vendor contacts.

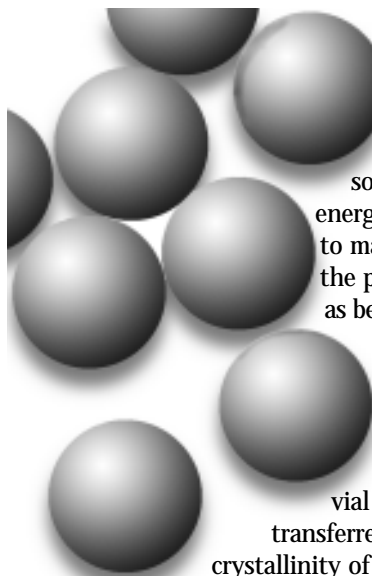
When dry ice is spread over floor tiles and allowed to sit for a few minutes, the chilled tiles separate from their adhesive bond with the sub-floor. This eliminates the physical exertion needed to dislodge the tiles using the scrape-hoe method. The tiles can then be picked up by hand or scooped up with a shovel. Once the tiles are separated from a section of sub-floor, the dry ice is redistributed to other areas before it evaporates, providing additional cost savings.

Y-12 Industrial Hygiene (IH) provided guidance concerning appropriate PPE for the dry-ice technique. IH determined that the carpenters did not have to be fully dressed out and in respirators. PPE was reduced to the basic use of gloves, safety glasses, and long-sleeved coveralls, reducing the possibility of heat stress. IH supplied a technician for on-site oxygen level monitoring during the work. There were no worker injuries.

The removal would have taken workers approximately four weeks to complete using the old method; the dry ice removal technique took two weeks. The original tile removal method was estimated to cost \$69,600, while the dry ice method was estimated to cost \$32,600, for an estimated overall cost avoidance of \$37,000, and a waste avoidance of about 218 kilograms of PPE waste.

Contact Jan Gilbert, Y-12, 865-241-2567 or gtl@y12.doe.gov

Ames Lab uses ball milling to combine solid organic material



Researchers at the Department of Energy's Ames Laboratory in Iowa say they have found a way to combine solid organic materials without the use of solvents. The process uses high-energy ball milling, traditionally used to make metal alloys. Ball milling has the potential to replace solvents such as benzene and dichloromethane, which can pose disposal problems, the Ames scientists say.

Solid organic materials are placed in a hardened steel vial along with steel balls. When the vial is shaken, the mechanical energy transferred into the system alters the crystallinity of the solids and causes mass transfer, eventually combining the materials into new compounds. The process could be applied to reactions used to make drugs and agricultural chemicals, according to Ames senior scientist Vitalij Pecharsky.

Contact Kerry Gibson, Ames Laboratory, 515-294-1405 or kgibson@ameslab.gov

20th P2 Technology Workshop: Send your scientists to Arizona

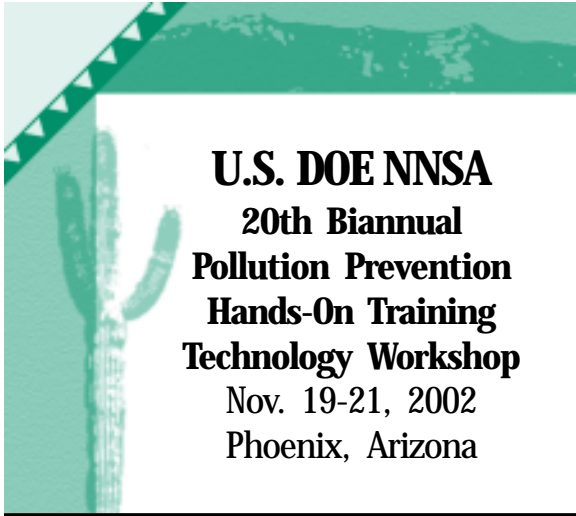
The Department of Energy (DOE) National Nuclear Security Administration's (NNSA) 20th Biannual Pollution Prevention Hands-On Training Technology Workshop will be held Tue. Nov. 19 through Thu. Nov. 21 at the Pointe South Mountain in Phoenix, Arizona.

Workshop participants will hear from exciting and knowledgeable speakers about current issues related to pollution prevention, and will tour some of the most environmentally conscious industries in the Phoenix area, as well as networking with peers from across the DOE complex.

Speakers and site visits will focus on topics such as environmental management systems, green building, renewable energy, sustainability, design for environment, waste stream elimination, and more.

NNSA's P2 workshops are directed primarily toward DOE and contractor personnel who are actively involved in daily operations at DOE laboratories and production facilities, although representatives of other government agencies may attend if space permits. Past and current industry hosts are also invited.

Contact Julie Lyons, MER, Inc., 423-543-5422 or mer@mer-inc.com



U.S. DOE NNSA 20th Biannual Pollution Prevention Hands-On Training Technology Workshop Nov. 19-21, 2002 Phoenix, Arizona

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